*iens* Walton, 1929, development to infective larvae occurred in fecal pellets with transmission to new hosts by skin penetration. *Hyla japonica* is a new host record for *O. insulae.*

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***Research Note***

# *Glypthelmins pennsylvaniensis* (Trematoda: Digenea) in the Spring Peeper, *Pseudacris c. crucifer* (Anura: Hylidae), from Southwestern West Virginia

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ABSTRACT: Fifty-one of 120 northern spring peepers, *Pseudacris c. crucifer* (Wied-Neuwied 1838), collected from 3 different habitats in Wayne County, West Virginia were infected by *Glypthelmins pennsylvaniensis* Cheng, 1961. The lowest mean intensity (2.5) of infection was recorded from hosts in a temporary ditch habitat, while the highest mean intensity (8.9) was recorded for hosts collected in 1 of 2 marsh sites. There was no significant difference between the size (as weight) of infected versus uninfected hosts. There was a slight negative correlation between host weight and the number of *G. pennsylvaniensis* individuals present (i.e., larger hosts had fewer trematodes), but the regression coefficient was not significant (i.e., b = 0).

KEY WORDS: *Glypthelmins pennsylvaniensis, Pseudacris c. crucifer,* spring peeper, West Virginia.

The northern spring peeper, *Pseudacris c. crucifer,* is a small anuran that ranges from Ontario, Quebec, and southeastern Manitoba, south to northern Florida and eastern Texas (Green and Pauley, 1987). This springtime breeder is abundant in areas of brushy growth near small temporary or semipermanent ponds or swamps. There are no reports of parasites from this host species in West Virginia. After recovering specimens of *Glypthelmins pennsylvaniensis* Cheng 1961, from a small sample population of spring peepers in Wayne County, West Virginia, we set out to broaden our study to determine preva-

**Table 1. Prevalence and mean intensity of *Glypthelmins pennsylvaniensis* infections in spring peepers from Wayne Co., West Virginia.**

| Collection site | No. hosts examined | % prevalence/ no. hosts infected | Mean intensity (SE) |
|---|---|---|---|
| BFD | 24 | 8.3/2 | 2.5 (NC†) |
| BFM | 46 | 52.2/24* | 8.9‡ (1.28) |
| SHM | 50 | 50.0/25* | 2.6‡ (0.41) |

* $\bar{x} = 0.0007$, 1 df, $P > 0.05$.

† NC = not calculated because only 2 hosts, both gravid females, were infected.

‡ Means are significantly different ($P < 0.05$).

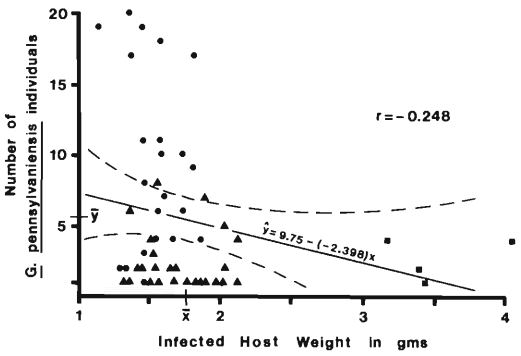


**Figure 1. Scatter plot of infected host weight with numbers of *Glypthelmins pennsylvaniensis* present. Each symbol on the plot represents a single infected host. Closed circles indicate BFM and BFD males; closed squares indicate BFM and BFD females; closed triangles indicate SHM males. $\bar{X}$ represents mean host weight (in grams). $\bar{Y}$ represents intensity (as mean number of trematode individuals per infected host). Curved dashed lines represent 95% confidence limits around the regression line.**

lence rates, intensity of infections, and the relationship between host size and numbers of this trematode species at 3 different collection sites (i.e., habitats) in the county mentioned above. All 3 western West Virginia collection sites can be found on the Lavalette, West Virginia quadrangle, USGS topographic map, photorevised 1989. Site #1 was a grass-lined drainage ditch located approximately 0.4 km downstream from the Beech Fork Lake Dam (BFD). Water accumulation in this shallow, 50 m long by 1 m wide ditch, was temporary (approximately 3 wk duration in late March to mid-April 1993). The entire BFD host sample population of 24 individuals was collected on the evening of 27 March 1993. Site #2 was a ≅0.5-ha marsh located at the headwaters of Stower's Branch of Beech Fork Lake (BFM), a U.S. Army Corps of Engineers flood control/recreation reservoir. This site is flooded from April through October (a summer pool). Dominant vegetation at BFM is soft rush (*Juncus effuses*) and cattails (*Typha latifolia*). The sample population of 48 BFM hosts was collected on the evenings of 21 and 25 April 1992. Site #3 located at Shoals, West Virginia (SHM), approximately 6 km north northwest of Site #2, is a permanently flooded marsh covering an area of ≅0.8 ha. A dense cover of buttonbush (*Cephalanthus occidentalis*) lined the perimeter of SHM, with bladderwort (*Litricularia gibba*) located extensively throughout the open water. A host sample population of 50 individuals was collected from SHM on the evenings of 17 and 19 April 1993.

Spring peepers from all 3 sites were collected by hand, placed in 4-liter screw-cap jars (no more than 10 animals per jar) containing moist paper toweling, and returned to the laboratory within 1 hr of capture. Hosts were maintained in a refrigerator at 4°C, no longer than 24 hr. Upon removal from the refrigerated jar, each host was weighed to the nearest tenth of a gram on a Mettler BB300 balance, then killed by pithing. At necropsy, hosts were sexed, and all trematodes found in the small intestine of each host were removed, placed on slides, then killed and fixed with 10% buffered formalin under light coverslip pressure. Selected trematode specimens were stained with Semichon's acetocarmine, dehydrated in an ethanol series, cleared in methyl salicylate, and mounted in Permount®. Two voucher specimens of *G. pennsylvaniensis* are deposited in the U.S. National Museum Parasite Collection (Beltsville, Maryland 20705) under Helminth Collection Number 83429.

A total of 283 *G. pennsylvaniensis* individuals were recovered from 51 of 120 spring peepers, *P. c. crucifer,* examined from the 3 Wayne Co., West Virginia sites described previously. Prevalence of infection for hosts collected in the ditch (i.e., BFD habitat) was obviously lower than prevalences for hosts in either semipermanent (BFM) or permanent (SHM) marsh conditions (Table 1). While differences in prevalences between hosts in the 2 marsh habitats were insignificant ($\chi^2 = 0.0007$), the mean intensity of infection in BFM hosts was significantly higher ($t = 4.782$, 47 df, $P < 0.05$) than that found in their SHM counterparts (Table 1). Our observed prev-

**Table 2. Mean size (as weight in grams) of hosts infected with *Glypthelmins pennsylvaniensis* versus uninfected hosts. Weights of males and females were combined to calculate means and standard errors.**

| Collection site | Infected hosts | | | Uninfected hosts | | |
|---|---|---|---|---|---|---|
| | No. of ♂♂ | No. of ♀♀ | Mean (SE) | No. of ♂♂ | No. of ♀♀ | Mean (SE) |
| BFD | 0 | 2 | 3.74 (—) | 19 | 3 | 2.14 (0.096) |
| BFM | 22 | 2 | 1.68 (0.107) | 21 | 1 | 1.75 (0.070) |
| SHM | 25 | 0 | 1.70 (0.050) | 25 | 0 | 1.85 (0.046) |

alences for *G. pennsylvaniensis* in *P. c. crucifer* from West Virginia marshes are higher than the 11.4% and 38% recorded by Muzzall and Peebles (1991) from 2 marsh areas in Michigan. Mean intensities of *G. pennsylvaniensis* infection found in hosts from the ditch (BFD) and permanent marsh (SHM) were relatively low (Table 1), but the mean intensity (±1 SD) of 8.92 (6.29) in temporary marsh (BFM) hosts is virtually identical to the 9.0 (6.1) recorded by Muzzall and Peebles (1991).

Comparisons between infected versus uninfected host weights at both marsh sites revealed no statistical differences (Table 2). Then too, there was no significant relationship ($b = 0$; $t = -1.79$, 49 df, $P > 0.05$) between size of infected hosts and the number of trematodes present (Fig. 1). Any predictive value of y relative to its corresponding value of x is obviously unreliable, as evidenced by the scatter around the regression line (Fig. 1) and the calculated $r$-value of $-0.248$. This lack of correlation between host size and intensity of infection was also referred to by Muzzall and Peebles (1991) who noted that, "There were also no distinct increases in infection for each helminth species ... with frog length."

*Glypthelmins pennsylvaniensis* was described by Cheng (1961) from spring peepers in Pennsylvania. Since then this trematode species has been reported in *Pseudacris* spp. from Georgia (Sullivan and Byrd, 1970), Wisconsin (Coggins and Sajdak, 1982), and Michigan (Muzzall and Peebles, 1991).

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## Obituary Notice

Paul C. Beaver

died December 23, 1993.

Elected to Life Membership, 1986